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ABSTRACT

Activity plans for fifth grade outdoor education experiences comprise the bulk of this curriculum guide. Many of the outlines have been developed through practical application and experimentation by staff members of the Outdoor and Environmental Education Center (OEEC) of the Harrisburg, Pennsylvania, City Schools. Activities and studies for the winter are related to reptiles, composition and germination of seeds, history of living things, rocks and minerals, erosion, ropes and knots, camping equipment and outdoor survival, wood cutting, and observation. Spring activities include the study of birds, flowers, simple plants, outdoor cooking, reforestation, and gardening. Each plan outlines: (1) steps for classroom introduction of the subject and preparation of the students for their outdoor laboratory exercises, (2) information as provided in the OEEC activity, and (3) topics/projects to consider for classroom follow-up and reinforcement. Vocabulary words, films, and books are listed where appropriate as supplemental aids. This work was prepared under an ESEA Title I contract. Related documents are SE 015 163 for grade four and SE 014 707 for grade six. (BL)

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Harrisburg City Schools

DR. DAVID H. PORTER, Superintendent

ESEA Title I

Outdoor and

Environmental

Education

Center

Fifth Grade: Winter and Spring Curriculum Guide

SE 015 164

ED 068368

HARRISBURG CITY SCHOOLS

E. S. E. A. - TITLE I

OUTDOOR AND ENVIRONMENTAL EDUCATION CENTER

FIFTH GRADE

WINTER

SPRING

CURRICULUM GUIDE

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HARRISBURG CITY SCHOOLS
OUTDOOR AND ENVIRONMENTAL EDUCATION CENTER
210 OAKLEIGH AVENUE
HARRISBURG, PENNSYLVANIA 17111

EDITED BY: JOEL ROBERT JACOBS

Curriculum guide photography by JOEL ROBERT JACOBS

HARRISBURG CITY SCHOOLS 1972

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CHARLES A. ROSINI
Director of Outdoor and Environmental Education

We fondly dedicate
this curriculum guide to

MR. GEORGE F. BAUMAN

first director of
the Harrisburg City Schools
Outdoor and Environmental Education Center

FORWARD

This curriculum guide is comprised of activity plans, some of which have evolved from originals written by George F. Bauman in 1966, some of which have been penned by staff members of the O.E.E.C. either jointly or individually and some of which have been authored by myself.

Many of the outlines, developed mostly through practical application and experimentation, have been changed, refined, simplified, enlarged and revised for over six years. It is my hope that all of them will remain in a state of flux.

What we have here is a guide, not a bible. In order to be effective it must remain open to criticism, expansion and future editing.

The following people have contributed their time and skills to the creation of this guide either by researching and writing materials for it, or by teaching from activity plans contained within it, or both: E. Arnold Mahey, Lyvonne LeFlore, G. Henry Osborn, Peter M. Hauer, V. Lee Hartwick, Mrs. Connie (Jones) Miller, Dianne I. Martin, Barry R. Patterson, Mrs. Audrey McGahen, Mrs. Mary Houts, and Mrs. Rose Ann Taylor.

Special thanks go to Mrs. Beverly J. Garland, who typed the original manuscript and to Mrs. Phoebe Ann Wilson whose sketches decorate the titles and the seasonal divider pages.

Funds for the operation of this project are made available though Title I of the Elementary Secondary Education Act. I most gratefully acknowledge the aid of Foster M. Brinser, Harrisburg City Schools' Director of Planning for Federal Projects Administration, in procuring the necessary monies to sustain our program year after year.

I am indebted to Charles A. Rosini, Director of the O.E.E.C., and to Benjamin F. Turner, Deputy Superintendent for Program Planning and Development, for their confidence in me.

Lastly, it is due to the faith and insight of Dr. David H. Porter, Superintendent of Schools, that our Center exists at all.

It is both rewarding and satisfying to work for a school district and an administration that allows a concept like environmental education to become a reality.

J.R.J.
March 1972

HISTORY

Outdoor Education began in the Harrisburg School District as a pilot study with fifth and sixth grade groups from Marshall, Riverside, Steele and Melrose. It was staffed by gym teachers and administrative personnel from the art, music and physical education departments among others.

After a successful pilot program, approval was granted for funding under Title I of the Elementary Secondary Education Act in April of 1966. Eight Harrisburg City Schools (Hamilton, Ben Franklin, Downey, Lincoln, Foose, Cameron and Boas) plus four parochial schools (Our Lady of the Blessed Sacrament, St. Francis, Sacred Heart and St. Patricks) began to participate in a fifth and sixth grade program "to stimulate an awareness of the out-of-doors" in children from the city.

The first director, Mr. George Bauman, influenced the program enormously. He originated the seasonal visitation approach which is still being used, and insisted that small group education in a nature studies program enhanced the rewards for both students and instructors.

The program began as one soundly based in plant study and outdoor nature experiences similar to many summer camps, and developed under the influence of its staff, its directors and hundreds of visiting teachers into today's tripartite of science and environmental studies supplemented with outdoor living activities.

Along with the school-year outdoor science program, the district operated a federally funded summer camp on the grounds of the Center. Fifth and sixth graders identified as having a science need or who were from low income families were eligible for the one week, overnight camping experience.

In the fall of 1969 the second director, Major Lorris E. Brown, turned much of the responsibility for curriculum development over to his staff. The instructors immediately began to enlarge the animal studies program which began under Mr. Bauman as a beg, borrow and bag affair with the Hershey Park Zoo lending some birds and mammals.

Under the present director, Mr. Charles A. Rosini, animal studies have been further expanded, archery and bait casting have been added to the curriculum, the summer camp experience has been opened up to the third and fourth graders in the form of a day camp, and the early childhood grades (K5, 1st and 2nd) and third grade have been included in the school-year program.

School year 1971-72 saw each kindergarten through third grade child in a city school, both public and parochial visiting the O.E.E.C. for two days and each fourth, fifth and sixth grader visiting for four days. At that rate an individual could participate in twenty days of environmental education in his first seven years of school.

Long range goals include a full kindergarten through twelfth grade program, the expansion of career education in environment in the Harrisburg City Schools, workshops to further integrate the outdoor laboratory experience and curriculum into the regular science program in the schools ultimately resulting in every elementary science teacher becoming an environmental specialist, and the development of a central warehouse at the O.E.E.C. for environmental learning aids which could not feasibly be acquired by every school.

The O.E.E.C. exposes children to learning activities which would be impossible to duplicate within the confines of any city elementary school. The necessity of growing up with these experiences in order to become better citizens of Spaceship Earth is its *raison d'etre*.

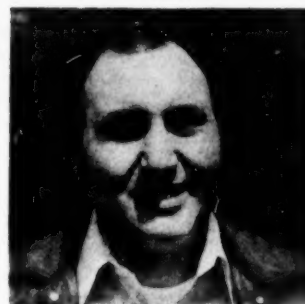


OEEC STAFF

CHARLES A. ROSINI, Director

A 1961 graduate of Pennsylvania State University with a B.S. in Physical Education and Health. He has done graduate work at Syracuse University, P.S.U. and Cortland State and is certified to teach health, physical education, general science and social studies.

He has directed the OEEC since February 1970.



JOEL ROBERT JACOBS,

Curriculum and Staff Development Specialist

A 1965 graduate of Rider College in Trenton, New Jersey with a B.A. in History, he holds his teacher certification from Penn State University in Elementary Education.

He has been with the OEEC since the spring of 1968, and is the editor of the OEECology News, and the Fourth, Fifth and Sixth Grade Curriculum Guides.

MARY D. HOUTS,

Curriculum and Staff Development Specialist

A graduate of Radcliff College, she holds an M.S. in Conservation of Natural Resources from the University of Michigan.

She joined the OEEC staff in September of 1971.



LYVONNE LEFLORE

A 1965 graduate of Jackson State College in Mississippi with a B.S. in Physical Education.

He has been with the OEEC since 1966 except for school year 1968-69 when he was a physical education and health teacher and head basketball coach at John Harris High School.

E. ARNOLD MAHEY

Graduate with a B.S. in Education from Clarion State College in 1956.

He has been with the OEEC since April 1966. He is a past president of the Harrisburg Education Association.



G. HENRY OSBORN

A 1960 graduate of Elizabethtown College with a B.S. in Science.

He has been with the OEEC since the spring of 1968.



PETER M. HAUER

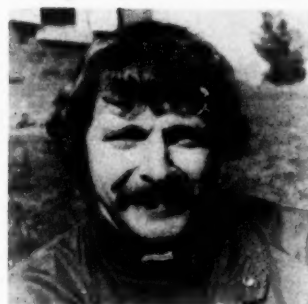
A 1968 graduate of Gettysburg College with a B.S. in Biology, and teacher certification from Shippensburg State College.

He has been with the OEEC since September 1968.

V. LEE HARTWICK

A 1969 graduate of Pennsylvania State University, he has also attended Shippensburg State College and Millersville S. C.

He has been with the OEEC since September of 1970.



BARRY R. PATTERSON

A 1971 graduate of Pennsylvania State University with a Bachelors in Elementary Education.

He has been on the teaching staff here since September 1971.

DIANNE I. MARTIN

After Pre Med. studies at Cambridge University in England, Martée graduated in 1970 with a B.A. in Biology from Messiah College. She is presently enrolled in a Masters of Education in Biology program at Shippensburg State College.

She has been with the OEEC since the fall of 1970.



AUDREY J. MCGAHEN

A 1948 graduate of Allegheny College with a B.S. in Biology with Secondary Education.

She has been a substitute and part time teacher with the OEEC since 1967.



ROSE ANN TAYLOR, substitute teacher.

SARA K. HINTON, teaching aide.



LATAYNA P. TOTTEN, teaching aide.

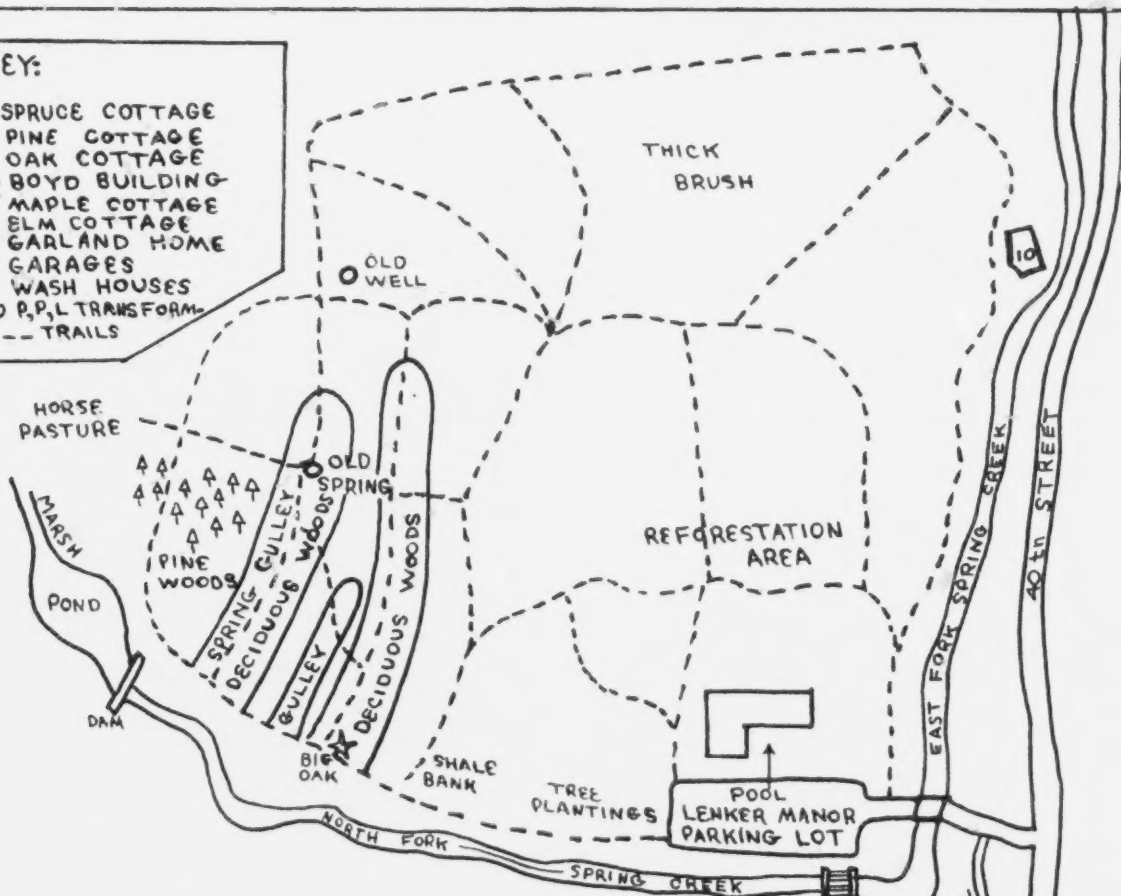
BEVERLY J. GARLAND, clerk-typist.



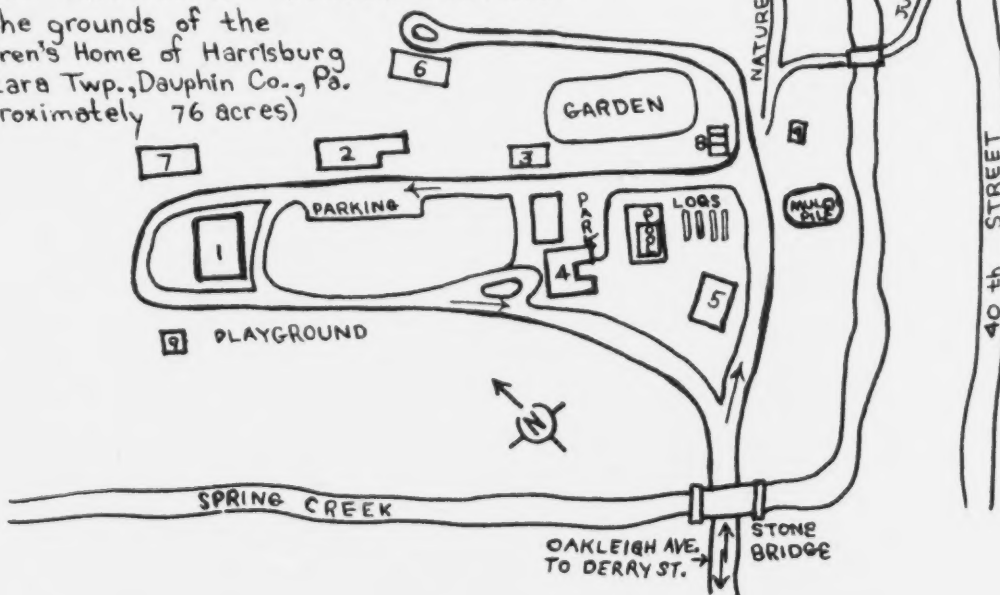
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KEY:

- 1 SPRUCE COTTAGE
- 2 PINE COTTAGE
- 3 OAK COTTAGE
- 4 BOYD BUILDING
- 5 MAPLE COTTAGE
- 6 ELM COTTAGE
- 7 GARLAND HOME
- 8 GARAGES
- 9 WASH HOUSES
- 10 P,P,L TRANSFORM
- TRAILS



OUTDOOR and ENVIRONMENTAL EDUCATION CENTER
of the HARRISBURG SCHOOL DISTRICT
on the grounds of the
Children's Home of Harrisburg
Swatara Twp., Dauphin Co., Pa.
(approximately 76 acres)



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NOTES TO THE TEACHER

HOW TO USE THIS GUIDE

- I. Description of activity plans
 - A. The activity plans found in this guide are standardized to a point.
 - B. Nearly all of them contain a Classroom Introduction, an O.E.E.C. Activity and a classroom Follow-up.
- II. Introductory and follow up activities
 - A. The introductory activities are meant to prepare the students for their outdoor laboratory experiences.
 - B. The follow-up activities reinforce them.
 - C. Preparation and reinforcement are necessary if the students are to achieve a maximum benefit from their activities at the Center.
- III. Interchanging suggested activities
 - A. Some of the suggested activities, can be interchanged between introduction and follow-up and unless otherwise proscribed the teacher should feel free to do so.
- IV. Vocabulary
 - A. Vocabulary is listed as an aid to the teacher.
 - B. It can be utilized in science or language arts classes or in developing your instructional materials.
- V. Films
 - A. Films available through the Harrisburg City Schools Film Library should be previewed by the teacher.
 - B. Films should always be discussed after the students have seen them.
- VI. School neighborhood nature walks
 - A. Many activities contain suggested themes for nature walks around the home school neighborhood.
 - B. It is possible to combine several of these into one walk.
 - C. The more properly directed nature walks the students experience the better.
- VII. Adjusting home school science curriculum
 - A. Since classroom visits are locked into a tight schedule at the beginning of each year and since

our curriculum is woven around seasonal guidelines some of the science offering in the home school may have to be adjusted to coincide with the OEEC experience.

VIII. Interdepartmental coordination

- A. There is a definite need for coordination between the teachers of various subject areas in the home schools so that the children obtain a maximum benefit from their outdoor laboratory experience.
- B. Many activity plans contain suggestions that can be utilized in art, language arts, music and social studies classes.
- C. The specific lack of pencil and paper activities at the OEEC is on purpose.
- D. Language arts work that relates to Center activities should be done in the classroom at school.
- E. Relating concepts discovered at the O.E.E.C. to the urban school-home environment is a necessity whether it be in science or academic classes.

IX. Notebooks

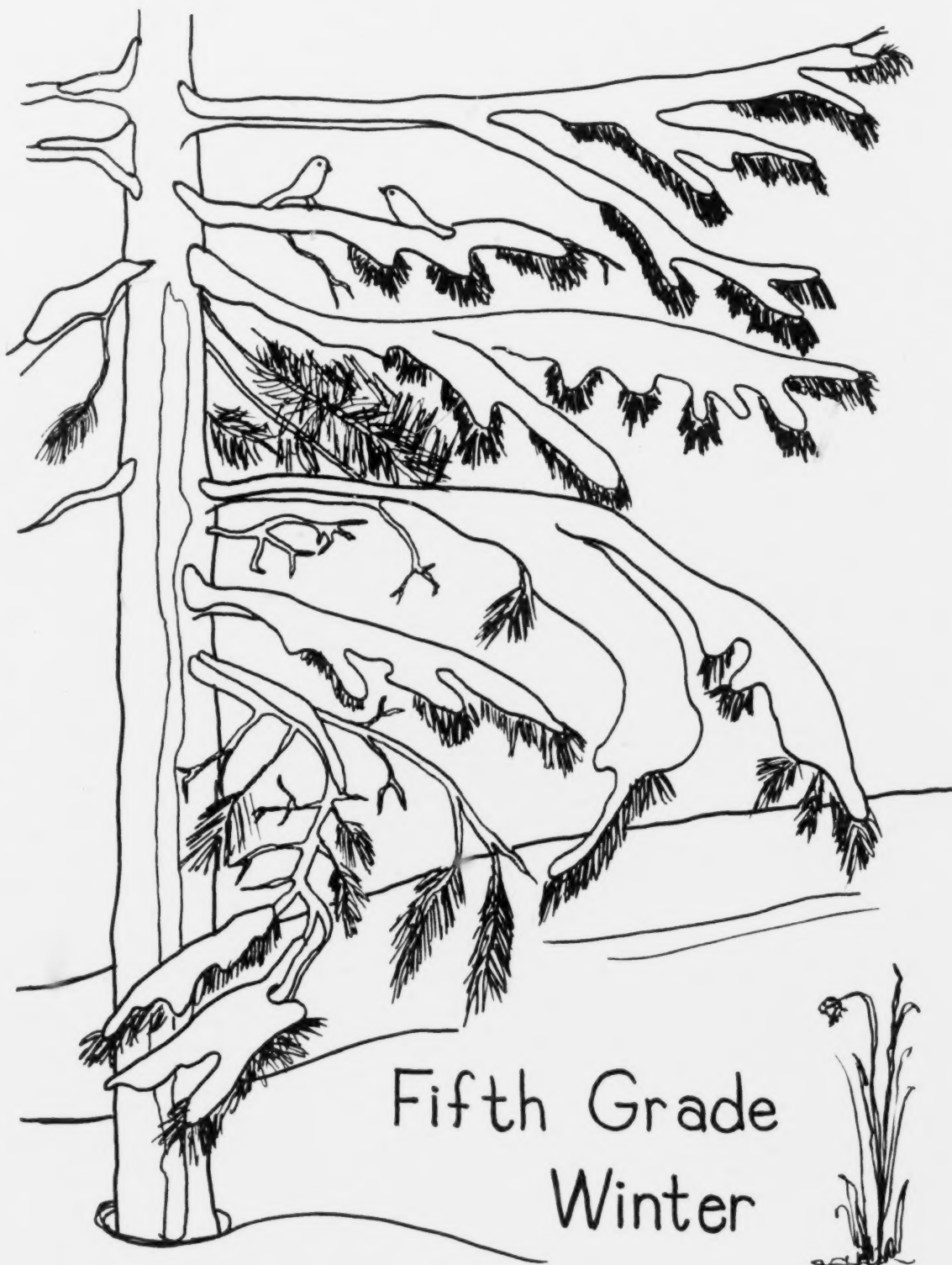
- A. Though no specific instructions will be found referring to notebooks, each child may keep one with all his work concerning the OEEC, or he could have a manilla folder or a large envelope to save his OEEC related school work.
- B. No grade should be given on this notebook or collection.
- C. It should not be carried with the students to the Center.

X. Telephone 564-0200 for eco-help

- A. Members of the OEEC staff are available for consultations with all teachers to aid in implementing this guide.
- B. Arrangements can be made for OEEC staff members to come to your classrooms for special teaching visits.
- C. If you think of a neat idea, and need advice or suggestions to complete it, call us.
- D.. The OEEC will lend you any teaching aid, exhibit or specimen that it is not utilizing for instruction at the time you ask.

XI. The blank spaces opposite the printed pages are provided for notes.

to the children . . .





Classroom Introduction

1. When dinosaurs walked on the face of the earth, it was called "The Age of Reptiles."

Look at some pictures of dinosaurs. How do you think they are similar to our modern day reptiles? How are they different?

A good book for reference is: "The Giant Golden Book of Dinosaurs and Other Prehistoric Reptiles," by Jane Werner Watson, published by Golden Press, Inc., Rockefeller Center, New York 20, N. Y.

2. Vocabulary

Reptile	Tortise	Vestigial	Poacher
Lizard	Crocodile	Scavenger	Poison
Turtle	Alligator	Predator	Dinosaur
Snake	Caiman	Venom	Chameleon

O.E.E.C. Activity

- I. Clarification:
 - A. Reptiles have scales.
 - B. They have lungs.
 - C. Their teeth are usually uniform in size and shape. Exceptions to this are poisonous snakes, and turtles and tortises.
 - D. They are cold blooded.
 - E. Some have legs and clawed toes.
- II. Types of Reptiles:
 - A. Snakes - No legs, but probably had them in earlier times. Example - The vestigial limbs of the boa.
 - B. Lizards - The majority of lizards have legs and clawed toes. They also have moveable eyelids.
 - C. Crocodilians - Large reptiles. This type includes crocodiles, alligators and caimans. They resemble lizards except that the jaw extends to form a long snout. The nostrils are at the tip of the snout to allow the animal to breathe when floating in the water.

- D. Turtles and Tortises - Have a special protective shell into which they can pull their head and limbs.
 - 1. Turtles live in water.
 - 2. Tortises live on land. (A Box "Turtle" is really a tortise).

III. General Characteristics

- A. Reproduction:
 - 1. Snakes - Some lay eggs, others are live-bearers.
 - 2. Turtles and Tortises lay eggs and bury them.
 - 3. Lizards lay eggs.
 - 4. Crocodilians build nests and lay eggs.
- B. Feeding Habits
 - 1. Snakes eat their food alive. They may do this by:
 - a. grabbing it with their teeth.
 - b. constricting to stop the victim from breathing.
 - c. poisoning the victim by injecting venom from their fangs.
 - 2. Turtles and Tortises have a wide variety of food.
 - a. turtles eat mostly fish and aquatic plants.
 - b. tortises eat many kinds of berries, and worms, and almost anything else.
 - 3. Lizards eat mostly insects.
 - 4. Crocodilians are scavengers. They will eat almost anything, but usually eat fish and animal flesh.
- C. All reptiles "shed" their old "skin." This allows for growth.
- D. During the winter, reptiles hibernate. Since they are cold-blooded, they take on the temperature of their surroundings.

IV. Special Characteristics

- A. There are only a very few poisonous reptiles in the U.S.A.
 - 1. Snakes - Rattlesnake } in Pennsylvania
 - Copperhead }
 - Coral Snake }
 - Water Moccasin }
 - 2. Lizards - Gila Monster
 - Mexican Beaded Lizard
- B. Lizards have eyes that can move in opposite directions. This advantage allows them to watch for food or danger over a wide area.
- C. Some lizards, like the chameleon and the anole, have the capability of changing their color as a means of protection. They can blend in with their surroundings.

V. Tall-Tales About Reptiles

- A. "Milk Snakes milk cows." No! A snake's mouth is not adapted to sucking. This kind of snake is often found in farmers' fields because there they can catch mice and other rodents.
- B. "If a snake's head is cut off, the body will live until sundown." No way! The movement is just a reaction of the nervous system.

- C. "You can tell a poisonous snake by the shape of its head." Not always true. One tall-tale is if a snake's head is triangularly shaped, it is poisonous. Look at the boa! He is non-poisonous. The cobra and the black mamba are two of the world's most deadly snakes and their heads are round and blunt. The copperhead and the rattlesnake, however, do have triangular heads.
- D. "The pupils of a poisonous snake's eyes are slits rather than round." Don't try it! If you're close enough to see a poisonous snake's eyes, you may be in for trouble!

VI. Economic Importance

- A. Some people eat turtle soup and snake meat.
- B. Reptiles help farmers by keeping the insect and rodent population to a minimum.
- C. Venom is extracted from poisonous reptiles to make medicine and anti-venins.
- D. Some people use snake and alligator skins to make shoes, purses, wallets, belts and other goods. This practice is slowly disappearing as people realize the importance of reptiles as predatory animals.

VII. Conservation of Reptiles

Reptiles are important in maintaining the balance of nature, and therefore should not be harmed. Some people think that snakes are bad, and so they try to kill every one they see. By doing this, men are only hurting themselves because the insect and rodent populations will grow.

The state of Florida's conservation department has made it illegal to kill or take alligators and crocodiles from that state. Some people still do it. They are called "poachers." When people buy alligator and snake articles, they give these nasty poachers an excuse to kill more animals.

You can be a good conservationist by not collecting or harming these animals, and by not destroying their habitats.

Classroom Follow-up

1. Make a list and collect pictures of the common species of reptiles in Southeastern Pennsylvania. You may wish to refer to the booklet "Pennsylvania Reptiles & Amphibians," published by the Pennsylvania Fish Commission, 3534 Walnut Street, Harrisburg, Pennsylvania.
2. Study about snake venom and how anti-venin is made.
3. Make a terrarium and include a reptile.
 - a. a desert terrarium with cactus and a chameleon or other lizard.
 - b. a forest terrarium with a garter or black snake, and some small plants.

4. Films from the Harrisburg City Schools film library that relate to reptiles are:

"My Turtle Died Today"

"The Dinosaur Age"

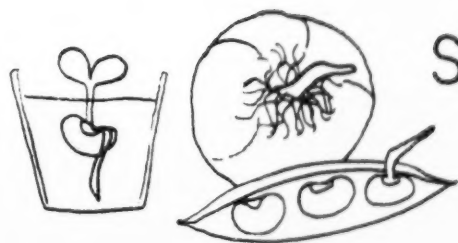
"Reptiles Are Interesting"

"The Turtle- Care Of A Pet"

"Tuffy, The Turtle"

"Snakes (2nd Ed)"





SEEDS

composition
germination

Classroom Introduction

Concepts to be understood prior to O.E.E.C. visit.

I. Composition

- A. A seed contains a **baby plant** and a baby root.
- B. A seed contains the food this baby plant needs to grow until it can make its own food through photosynthesis.
- C. A seed has a seed coat or covering.

II. Germination

- A. In order to germinate a seed must have water and the right temperature (heat).
- B. Oxygen from the air is needed to help the baby plant use the food in the seed.
- C. Seeds germinate in the spring because the conditions for growth are met.
- D. There is a tiny hole in the seed coat through which the food in the seed absorbs water.
- E. As the food absorbs water it begins to swell. This causes the seed coat to split.
- F. Once the seed coat is split the root from the baby plant can poke its way out of the seed.
- G. The root will grow toward the source of water. Since ground water is usually below the surface, most roots grow down.
- H. The baby plant will grow toward the source of heat. Since the sun is in the sky, the plant grows upward.

III. Experiments

- A. Seeds must have the proper conditions to grow. Try this experiment.

Materials:

12 paper cups, marker, two saucers or aluminum pie plates, cotton, twenty bean seeds, soil, sand, sawdust.

Procedure:

1. Check to see that your seeds are alive by soaking the seeds in water, then laying them on water soaked cotton in one saucer or pie plate and covering them with the other. You will know they are alive when a root breaks through the seed covering.

2. Number your cups from 1 to 12.
3. Have your students suggest the kinds of conditions they wish to use for this experiment. Each seed, grown under different conditions, should grow differently.
4. Plant one live seed in each cup about 1/2" below the surface of the material used. Make sure all are planted the same way.
5. Observe - Record - Discuss.

Cup No.	Suggested Conditions	Daily Record
1.	Good soil. Sunlight. Watered daily.	
2.	Good soil. Sunlight Watered every other day.	
3.	Good soil. Sunlight Watered once a week.	
4.	Good soil. No light. Watered daily.	
5.	Good soil. No light. Watered every other day.	
6.	Good soil. No light. No water.	
7.	Sand. Sunlight. Watered daily.	
8.	Sand. No light. Watered daily.	
9.	Sawdust. Sunlight. Watered daily.	
10.	Sawdust. No light. Watered daily.	
11.	Good soil. Shade. Watered daily.	
12., etc.	Your variations.	

- B. When a seed germinates, tremendous force is exerted. Try this experiment.

Materials:

A small bottle and a cork to fit it, enough bean seeds to fill the bottle, a paper bag.

Procedure:

1. Fill the bottle up to the neck with dry bean seeds.
2. Add enough water to just cover the beans.
3. Put the cork in.
4. Put the bottle in the paper bag. (Seeds germinate best in the dark).
5. Examine the bottle in 3 or four days.
6. The seeds should have sprouted with enough force to push the cork out of the bottle.
7. To insure success try this experiment with two bottles. Examine one after 3 days and one after 4 days.

O.E.E.C. Activity

During the first part of this activity the instructor will review what a seed is composed of, and how and why it begins to grow.

We will have many seeds soaking between wet paper towels for various lengths of time so that the students can see how they swell, and what they look like when they germinate.

Some of these seeds will be split or cut up with a single edged razor blade and examined with magnifying glasses.

The instructor will also explain the experiments with seeds that the students will see in our classroom.

1. Growing conditions experiment.
2. Seeds force experiment.
3. Depths of planting experiment.

During the second part of this activity the students will plant a seed to take back to their classroom or home.

Materials:

Paper cups, sand, peat moss, scissors, masking tape, pens, seeds.

Procedure:

1. Cut off a piece of masking tape about 2 inches long.
2. Stick it to a wooden table top and then write your name, the date, and the kind of seed you intend to plant on the tape.

Joe Student
Dec. ??
Corn

3. Now pull up the tape and stick it to a paper cup.
4. Fill your paper cup half full of sand.
5. Fill it the rest of the way with peat moss packed tightly.
6. Dump the sand and peat moss out and mix them together thoroughly.
7. Put this mixture back in the cup.
8. Leave at least a quarter of an inch of space at the top of the cup for watering.
9. Ask your instructor for the seed you need.
10. Plant it to a depth necessary for the type of seed it is. Your instructor will advise you of this.
11. Add water.

Classroom Follow-up

1. Have each student keep a record of the seed they planted at the

O.E.E.C. Compare the results. The students could keep these seeds in your science classroom or at home.

2. Conduct other experiments with seeds, either student suggested or initiated by the science teacher.
3. Films from the Harrisburg City Schools film catalog:

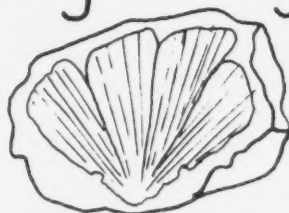
"Let's Watch Plants Grow"

"Plants Are Different And Alike"

"How Does A Garden Grow"



History of Living Things



Classroom Introduction

The earth was formed about 5 billion years ago, but the first living things did not appear until about 1 billion years ago. Life on our planet is really a "new" thing.

The birthplace of life on earth was the oceans. Very simple one-celled forms, similar to the primitive algae and protozoans of today first appeared there.

For the first 1/2 billion years of life on earth, things were as simple as a patch of algae on a rock. Not until about 500 million years ago did larger, more familiar, life forms exist.

These were mostly invertebrate ocean forms with shells like today's clams, crabs and snails, and later a few simple and primitive fish with backbones. At this time only a few varieties of simple plants existed on the lifeless land, but these prolific plants were important because they provided much of the oxygen for the land animal life to come.

The first land animals were small fish-like amphibians which lived in the first forests during the periods of coal formation 1/4 billion years ago. The "Age of Reptiles" soon followed. It lasted 100 million years and saw the rise and fall of the gigantic dinosaurs.

The present "Age of Mammals," which began about 60 million years ago, has included three Ice Ages and the advent of man between 1 and 2 million years ago.

The most fascinating and difficult thing for the students to understand in the history of life on earth is the concept of time.

1. Earth has harbored life, so far, for 20% of its existing time.
2. If the history of earth were condensed into a movie one year long, the story of life would take approximately two and one half months. Man's part in the movie would last about three and one half hours, and the written history of man would flash by in the last two or three seconds at the end.
3. Man's written history would be like comparing a few pennies to 5 billion dollars.
4. If a line, delineating the history of the earth, were drawn horizontally from one end of a chalkboard to the other, the history of man could be encompassed with a single vertical chalk mark at the edge.

Yet that 1 or 2 million year history of man has been long enough for new species to have evolved, others to have become extinct, new continental shore lines to have formed, and mountains to have been born and to have died.

Our knowledge of life past has been gained through the study of fossils and the concept of evolution.

Fossils are any naturally formed remains or evidence of the size, shape or form of prehistoric life. They may be molds, casts, alterations of hard parts, borings, coprolites (fossilized fecal material), footprints, or any variety of preserved evidence. They are most commonly found in sedimentary rocks such as shale, sandstone or limestone. Without fossils, we would have no knowledge whatsoever of past life.

The great variety of living species on the earth, both past and present, is due to evolutionary change, a product of adaption to the environment versus failure to change. Through a large expanse of time, adaption and extinction control the numbers and variety of species.

- I. Make imitation fossil imprints and casts. Construction of a model like this will help illustrate fossil origin.

Materials:

Plaster of paris, vaseline, small basins, paper plates or aluminum pie plates, an object to play the part of a long decayed animal or plant. A scallop shell is appropriate because of its beauty and its similitude to actual fossils, however, simple items like small twigs, insect shells, plastic animals and the like can be used.

Procedure:

1. Rub a light coat of vaseline over the object.
2. Pour a cupful of plaster into the basin, add a little water, and stir.
3. Add more water until the mixture is like heavy cream. This mixture will be the soft sediment in which your fossil is formed.
4. Pour the plaster mixture into a plate, but do not fill the plate. In a few minutes the mixture will thicken.
5. Put your shell or other object into it. Push it in only up to its widest part.
6. Let the object set in the plaster, and then carefully pull it out. The shape of your imitation fossil print will be left in the plaster.
7. Let this print dry overnight.
8. To make a cast of the original object you use the dried imprint.
9. Rub a thin coat of vaseline over the entire surface of the plaster including the hollow space that is the imprint.
10. After mixing another cup of plaster, pour it onto the vaselined plaster of the imprint.
11. Let it dry for at least an hour.
12. Lift it off carefully. On the underside will be a cast of your fossil print.

- II. In a discussion, stress the fact that dinosaurs and cave men did not live at the same time.

O.E.E.C. Activity

The instructor will review the in-classroom discussion of the history of living things at the same time displaying and letting the students handle samples of the OEEC's fossil collection.

Listed below is a chart showing the fossils the students will see put into their respective time periods.

1. From the beginning to 600 million years ago - No fossil remains.
2. 500 million years ago - "The Age of Invertebrates."
Coral (West Virginia) - These shells built up into great reefs, as seen in the Pacific Ocean of today.
Crinoid "stems" - These pieces are from a strange marine animal that looked like a flower on a stem.
Brachiopods - These shells belonged to ocean animals, now extinct, which at one time lived right where Harrisburg is now located.
Pelecypods - These are ancient clams.
Trilobites - Crab-like animals which ruled the world many times longer than man's stay here.
3. 300 million years ago - "The Age of Fish."
Shark teeth - The sharks were some of the first vertebrates, and they are still here!
Fish fossils - Underwater vertebrates.
4. 265 million years ago - "The Age of Coal Formation," Ferns and Amphibians.
Althopteris - Ancient fern leaf from the great coal forming swamps.
Lepidodendron - A root of an extinct tree. Dinosaurs may have eaten leaves from this tree!
Microsaurs - Tiny bones from small salamander-like amphibians.
5. 210 million years ago - "The Age of Reptiles."
Dinosaur bone - This has marrow in the middle.
Dinosaur track - A small dinosaur stepped in the mud on the shore of a lake. The mud turned to slaty-shale rock which preserved his track.
Dinosaur gastrolith - A stone eaten by a dinosaur which got polished grinding up the food in his belly. Birds do this today. Their stones are called gizzard stones. From this scientists find a correlation between today's birds and yesterday's giant reptiles.
6. 60 million years ago - "The Age of Mammals."
Orodont skull - This small cat-like mammal lived in the American west. They are now extinct.
Ursus Speleas toe bone - This giant cave bear fought cave men in Germany 20,000 years ago. He too is extinct. This bone is original. It has not had time to fossilize.

7. Leg bone: Indian - Not old enough to be a fossil. This Indian was buried in a cave eight hundred years ago.

Classroom Follow-up

1. Vocabulary
Fossil - Preserved evidence of prehistoric plant or animal life.
Sedimentary rock - Rocks formed from hardened sand, mud and lime. Fossils are common in these rocks.
Trilobite - A small crab-like animal that ruled the seas during "The Age of Invertebrates."
Coal Age - A warm, tropical time period when large swamps accumulated the plant materials of today's coal beds. The amphibians, first land vertebrates, come from this age.
Dinosaurs - A group of plant and flesh eating reptiles that grew to immense size, lasted about 120 million years and quickly became extinct, allowing "The Age of Mammals" to emerge.
2. Have your students draw their favorite prehistoric animal.
3. Films from the Harrisburg City Schools film library which relate to this lesson are:
"Fossils Are Interesting," #189.
"Archaeologists At Work," #260.
"The Dinosaur Age," #261.
"Prehistoric Animals Of The Tar Pits," #262.
"What's Alive," #1033.
"The History Of Living Things," #2069.





Classroom Introduction

1. Have the students make a list of all the things in their home made from minerals and rocks. (Building materials, appliances, jewelry, salt, cans, bottles, tooth paste tubes, etc.)
2. Make a list of the minerals that are found in jewelry. Silver, gold, diamonds, jade, etc., not pearls.
3. List the rocks and minerals found and used in the Harrisburg area.

Shale- brick

Limestone- crushed stone for asphalt, etc.

Sand and gravel- cement and concrete

Coal- fuel (Upper Dauphin County)

Iron Ore- (Cornwall, Lebanon County)

4. Vocabulary:

Core

Lava

Metamorphic

Pressure

Crust

Magma

Mineral

Sedimentary

Igneous

Mantle

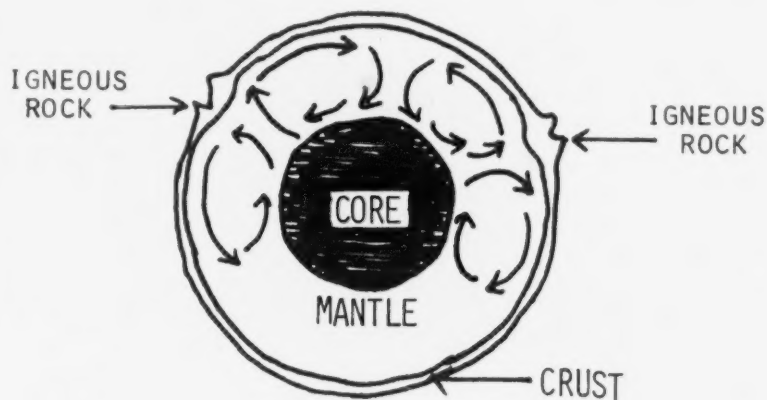
Molten

Surface

Volcano

O.E.E.C. Activity

- I. To understand how the rocks and minerals found at the earth's surface are formed, it is necessary to understand the composition of the earth itself.



- A. Crust - a thin shell of solid rock (6-30 miles thick) covering the earth's surface. All rocks known to man are found in this layer.
 - B. Mantle - nearly solid rock which flows very slowly (moves like silly putty).
 1. Heat currents within the mantle cause its material to flow in a circular manner (see diagram).
 2. When the currents flow upward, they force magma to the surface, cause the crust to uplift, and igneous mountains are formed. - Volcanoes can also be formed in this way.
 3. When the heat currents flow sideways, great heat and pressure are exerted on the crust and its rocks can be changed.
 - C. Core
 1. Composed mainly of iron and nickel.
 2. Nearly as hot as the Sun's surface.
 3. Liquid, responsible for the earth's magnetic field.
- II. Rocks - consist of two or more minerals and can be divided into three large groups based on their origin. Note: Examples of available rocks and minerals will be distributed to the students for their examination.
- A. Igneous - "Fire Made."
 1. Formed by solidification of molten magma.
 2. Volcanoes are a good source.
 3. Very hard, "speckled, and sparkled."

Examples:

 - Granite - widely used as building stone, curb stone, and tomb stone.
 - Basalt - usually volcanic, formed the Hawaiian Islands and much of the Northwestern United States.
 - B. Sedimentary
 1. Formed at the surface of the earth.
 2. When mountains and rock formations weather, the material is transported (usually by water) and deposited as layers of mud, sand and gravel which later solidify into rock.
 3. Harrisburg area and the Appalachians are sedimentary.

Examples:

 - Sandstone - hardened layers of sand.
 - Limestone - hardened shells and bones (lime).
 - Shale - hardened mud and clay.
 - Conglomerate - gravel, cemented together by minerals.
 - Coal - hardened layers of old vegetation.
 - C. Metamorphic - made when either igneous or sedimentary rocks are changed by great heat or pressure.

Caused by:

 1. Burial under heavy sediments.
 2. Heat from volcanic activity.
 3. Heat currents in the mantle.

Examples:

 - Quartzite - changed sandstone.

Marble - changed limestone.
Slate - changed shale.
Diorite - changed granite.

III. Minerals - chemical substances found in rocks.

1. Made of one material.
2. Can be very valuable.

Examples:

Gold, Salt, Aluminum, Iron, Copper, and Uranium.
Quartz - used to make glass.
Coal and Petroleum - not really minerals, but called
mineral resources.

Classroom Follow-up

1. Many people, including boys and girls, make a hobby of rock and mineral collecting. They spend many hours hunting, finding, identifying, collecting, polishing, cutting, trading and mounting semi-precious gems in displays and jewelry.

Have the students bring any rock or mineral collections they may have to school to make a display or tell what they know or can find out about them.

2. Have the students find out what rocks and minerals are used in your school. Make a list of the uses. Some examples are listed below.

Brick - shale or clay.
Asphalt - crushed limestone and asphalt oil.
Slate - asphalt tile or crushed stone roof.
Concrete - sand, gravel and cement.
Cement - made from baked, crushed limestone.
Plaster - baked gypsum.
Steel - iron.
Brass - copper and zinc.
Porcelain fixtures - clay, feldspar and quartz.
Pipe - iron and copper.
Electric wiring - copper.
Glass windows - quartz sand.
Plumbing fixtures - brass and chromium.
Record player needles - sapphire points.
Paint - lead, aluminum, many others.

3. Films from the Harrisburg City Schools film library about rocks and minerals are:

"Rocks And Minerals," #1001.
"Coal- A Source Of Energy," #2137.



Classroom Introduction

Erosion is the wearing away of soil or rock. In hundreds of thousands of years, erosion can wear away a mountain until it is level with the plains; it can cut a valley thousands of feet deep. The surface of the earth is constantly being changed by the forces of erosion.

There has probably always been much natural erosion. It is an important part of the whole process of mountain building and wearing down. Man's use and/or misuse of the land has led to millions of tons of fertile soil being eroded away that would not have been, if man had left nature alone. The United States Department of Agriculture created the Soil Conservation Service, to help teach people how to use the land without causing so much erosion.

There will be a tour at the OEEC to see examples of soil erosion, many of which could have been prevented by better planning and construction practices.

The classroom teacher should lead a short discussion of some of the causes of erosion which are not readily observable at the OEEC. Note: Most of the erosion evident at the OEEC was caused by rainfall and running water.

Causes of erosion.

I. Physical Weathering.

- A. Stream Erosion - When a stream flows, it cuts soil and rocks from one bank and then deposits the material on the other bank. The process of cutting away and depositing causes the stream to meander, or wind, like a snake.
 1. A youthful valley usually has steep V-shaped valley walls, with less pronounced meandering.
 2. With age, and more erosion, the valley floor becomes broader and finally the stream begins wide meanderings back and forth.
- B. Freeze-thaw Erosion - Water which is trapped between cracks in rocks will expand with tremendous force, when frozen. The severity of this type of erosion depends on the number of times the "freeze-thaw threshold" is crossed by temperature changes. Pot holes in streets are excellent examples.
- C. Wind Erosion - The wind can carry large quantities of sand at

high speeds, which can erode rock faces with a sand-blasting effect. This occurs mostly in dry climates.

- D. Glaciation - Glacial ice along a mountainside can slowly move down the slope scratching and grinding the bedrock and tearing it loose. This chipping action results in steep, rounded cuts called "matterhorns" or cirques. Note: A valley cut by a glacier becomes U-shaped while a stream cut valley is V-shaped.

II. Chemical Weathering.

- A. Rain falling through the atmosphere picks up carbon dioxide gas and becomes carbonic acid (like mild soda pop). Over long periods of time, rock can be dissolved by the acidic action of rainfall.
- B. Acidic ground water can dissolve limestone and form large, beautiful, underground caves.

O.E.E.C. Activity

Erosion Tour.

- I. Walk along the west side of Spring Creek (The Nature Trail) for a short distance. A gulley has been cut by water flowing down the steep slope to the left. Discuss the cause of the water flow, its effect and what has been done to stop it.
- II. Continue along the Nature Trail and observe the steep banks of the stream and the exposed tree roots. What will happen to the stream bank and trees?
- III. Follow the trail, cross the bridge, and turn left at the Lenker Manor Pool parking lot. Walk to the shale bank beyond the swimming pool. Sheet erosion has deposited small pieces of shale at the bottom of the slope. Gulleys have been cut by fast-moving rain water. Small pine trees have been planted on the slope to help stop erosion. Forests are a very important means of conserving top soil and farmland. Across the stream from the shale bank is another eroded gulley caused by improper grading and not providing culverts and drainage ditches for run-off water from roads that men have built.
- IV. Return to the parking lot. Follow the trail on the east side of Spring Creek (The Jungle Trail). Piles of soil have come down the bank on the left during winters, when there were rains and melting snow.
- V. When you return, look at the grounds around Pine Cottage.

Terraces and retaining walls have been built to retard erosion.

Classroom Follow-up

1. Show pictures and discuss contour farming.
2. Discuss wind erosion and the dust bowl disaster of the 1930's.
3. Have the students find examples of erosion around your school, in concrete and asphalt as well as the soil. Try to figure out what caused the erosion. Plan a class project to remedy an erosion problem on the school grounds.

4. Vocabulary:

Erosion	Expand	Contract	Glacier	Meander
Dissolve	Gulley	Deposit	Topsoil	Bedrock

5. Films from the Harrisburg City Schools film library about erosion:

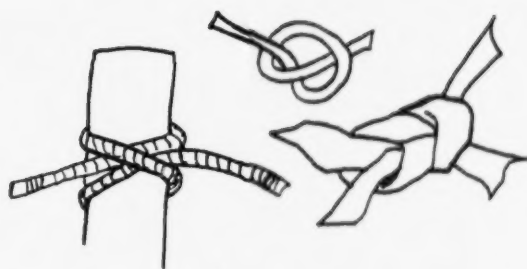
"Sand- The Desert In Motion," #191.

"Erosion," #194.

"River Of Ice- Life Cycle Of A Glacier (2nd Ed.)," 198.

"Soil- What It Is And What It Does," #1118.





Ropes & Knots

Classroom Introduction

1. Discuss the uses early man might have had for vines as ropes.
2. Discuss how people in different professions might use ropes and knots. Examples: Sailors; fishermen; farmers; builders; seamstresses; linemen; lumbermen; tree surgeons; and doctors.
3. Discuss how the students might use rope at home or for recreation. Example: clothesline, package tying, camping, sailing.

O.E.E.C. Activity

Objective:

To give the students an opportunity to see examples of different uses that some ropes and knots have, to let them handle ropes, to teach them to tie some basic knots, and to show them some uses for each knot they tie.

Procedure:

Each student will be given a six foot length of 3/8 inch Manilla Hemp Rope. The teacher will then explain some terms used when tying and handling rope, and demonstrate the safe use and proper care of rope.

Terms - End, bight, standing part, overhand loop, underhand loop, turn knots, hitches, splices, binder twine, sizes of rope and line.

Safe use - A rope should never be put around a persons neck. A rope should never be snapped like a whip. A climbing rope should never be used hand-over-hand. A clothesline is not a climbing rope.

Proper care - Ropes should be kept dry. Fire and friction should be avoided. A rope should always be checked for worn spots, cuts and weakness, caused by knots, before using. A rope should be coiled when stored.

As time permits the students will tie as many knots as possible.

Some knots they may tie are:

Stopper knots	- overhand knots, figure eight knots.
Binding knots	- square knot, surgeon's knot.
Joining knots	- sheet bend, fisherman's knot.
Loop knots	- bowline, running bowline.
Hitches	- half hitch, two half hitches, cow hitch, timber hitch, clove hitch, taut-line hitch.
Sheepshank	- used to shorten rope.

Classroom Follow-up

1. Have the students bring in different kinds of ropes, line, string and twine to make a display board identifying the ropes and listing their uses.
2. Have the students tie knots to be put on a display board. Label them, and list their uses.
3. Have the students write a story entitled, "What Ropes Are Used For," or "What I Would Like to do With Ropes".
4. Words to study and spell:

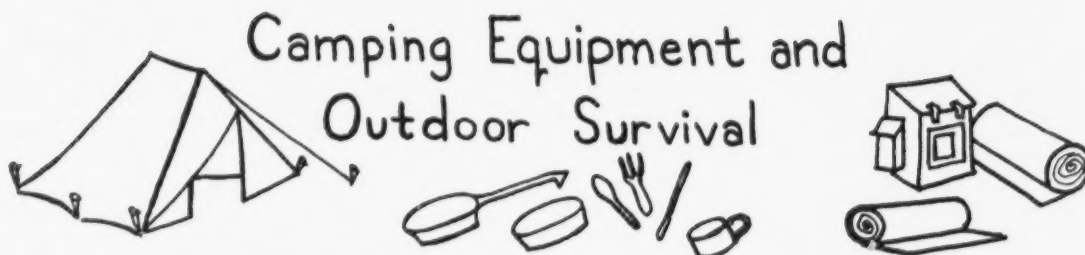
Rope
Knot

Loop
Splice

Coil
Join

Bind
Hitch





Camping Equipment and Outdoor Survival

Classroom Introduction

1. Have your students make a list of everything they think they should take with them on an overnight camping trip. Collect the lists. When the students return from the OEEC pass the lists out to them and have them add the things they forgot. See which student's list was most complete.
2. Invite a girl scout or boy scout leader in to your classes to tell your students about scouting.

O.E.E.C. Activity

Objectives:

1. To demonstrate the type of equipment needed for simple overnight camping trips and the means of packing such equipment. All items mentioned in this outline will be available for the students to observe.
2. To present a few helpful tips on what to do, if someone gets lost on one of these trips.

I. Camping Equipment

A. What to wear and carry

1. Clothing suitable for the locale, the season and the weather including:
 - a. long pants and long sleeved shirts.
 - b. socks.
 - c. a belt.
 - d. a hat with a brim.
 - e. a jacket, sweater, wind breaker or poncho.
2. Footgear
 - a. preferably well broken in and water proofed boots.
 - b. sneakers or tennis shoes if no boots are available.
3. Knife, either pocket or sheath.
4. Matches in a waterproof container.
5. Canteen with water not soda.
6. Compass.
7. Hankie or kerchief.

8. Notebook and pencil.

9. Some band-aids.

B. What to pack

1. Mess kit with knife, fork, spoon and can opener.
2. Extra shoes for in-camp wear such as moccasins or sneakers.
3. Extra underwear, shirts, pants and hankies.
4. Several extra pairs of socks, large band-aids in case of blisters, and foot powder.
5. Tooth brush, tooth paste, toilet paper and soap in water proof containers.
6. Kit with mirror, comb, brush, etc.
7. Towel and wash cloth.
8. Flashlight, spare batteries and bulb.
9. First aid kit. Can be homemade in a band-aid box. Should include safety pins.
10. Insect repellent.
11. Blankets and blanket pins, or sleeping bag.
12. Plastic bag for dirty clothes.
13. Swim suit and sunburn lotion.
14. Rope or cord.
15. Hand axe.
16. Poncho or raincoat.
17. Ground cloth.
18. Shelter half or tent.

C. How to pack (To be demonstrated by instructor)

1. Follow a checklist to make sure you haven't forgotten anything.
2. Place individual items in plastic bags before putting in pack. This assures dryness in case of bad weather.
3. Things needed first like a flashlight or a pair of socks should be packed on top.
4. A poncho or raincoat should be packed at the very top.
5. For comfort, soft, flat items should be placed in the pack so they rest against your back.
6. Distribute the weight evenly.
7. Pack food so it won't be squashed.

D. Packs

1. Suit cases are not suitable because they are bulky, not waterproof, break easily and must be carried by hand.
2. A regular knapsack is good.
3. Other suitable packs such as pack baskets, army surplus packs, duffel bags and various pack frames can be purchased.
4. Many packs can be homemade like:
 - a. gym bag and old pants pack.
 - b. a blanket roll.
 - c. a horseshoe pack.
 - d. a blanket roll around a regular pack.

II. What to do when lost

- A. Merely being out of sight of others in a strange forest gives many people the creeps. This is a natural feeling but a dangerous one. Never yield to it. Loss of mental control is more serious

than lack of food, water, or clothing. The person who keeps his head has the best chance to come through safely.

B. Things to remember.

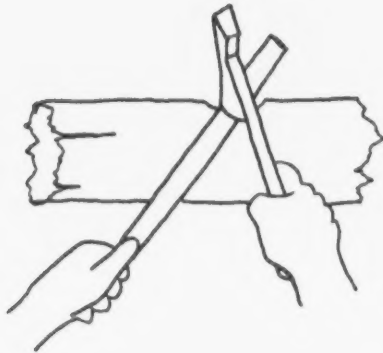
1. Stop, sit down and try to figure out where you are. Use your head not your legs.
2. If caught by night, fog or a storm, stop at once and make camp in a sheltered spot. Build a fire in a safe place. Gather plenty of dry fuel.
3. Don't wander about. Pick a path or a direction and follow it.
4. If injured, choose a clear spot and make a fire.
 - a. Signal fires are the quickest way to attract attention, but they should be built in the open where the fire can't spread into the woods.
 - b. In the day-time throw green branches and wet wood on the blaze to make smoke.
5. Don't yell, don't run, don't worry, and above all don't quit.

C. Each camper should "BE PREPARED" to get lost.

Classroom Follow-up

1. If there are boy scouts or girl scouts in your classes or students who go camping with their families, have them tell the other students about hikes or camping trips they have taken.
2. Have your students write a story about being lost in the woods.
3. Take a Saturday or Sunday hike with your students and some of their parents.





Wood Cutting

O.E.E.C. Activity

Objective:

To provide practical experiences in the proper use and safe handling of wood cutting tools.

Tools needed:

Axes, hand sledges, sledge hammers, wedges, bow saws, and two-man cross-cut saws.

Approach:

Explain to the students that before making outdoor fires, proper wood cutting skills are necessary. Also, the wood they will cut in the winter, they will use in their spring outdoor cooking classes.

Procedure:

Introduce the children to the tools that are used in wood cutting and review the function of each tool, and the necessary safety precautions.

- A. Sledge hammer - A steel tool with two heads used for hitting other objects, like the wedges. It is used with two hands. A very heavy tool, it should never be used when people are in front or behind, or within a radius of six feet of the user.
- B. Hand sledge - A short handled sledge hammer. It is used with one hand.
- C. Wedge - A steel tool used for splitting wood. It has a triangular shape. It must be kept sharp to function properly.
- D. Ax - A steel object with single or double blade. It has a wooden handle.
- E. Bow saw - A small saw that looks like a bow. It is used

to saw wood up to about 6 inches in diameter. It is used with one hand.

- F. Two-man cross-cut saw - A large saw used by two people to cut logs thicker than six inches.

Demonstrate wood splitting

- A. Place the pointed end of the wedge on a block of wood.
- B. Hold the wedge with one hand and tap on it with the hand sledge until it is firmly implanted in the wood.
- C. Hit the wedge with a sledge hammer until the wood is split.
- D. If necessary, use an ax to complete the splitting.

Divide the class into small groups and assign them various wood cutting and splitting jobs.

Distribute the tools.

Give personalized instruction where needed.





Observation Hike: WINTER

Classroom Introduction

1. Emphasize and discuss the need and reason for dressing appropriately for the weather and the activity.
2. Discuss what it means to observe something. Include in your discussion the terms look, smell, listen, feel and taste.
3. Films from the Harrisburg City Schools film library that relate to this hike are:
"Snow- A First Film," #1050.
"Plants Live Through The Winter," #1106.
"The Changing Forest- A First Film," #1245.

O.E.E.C. Activity

A. Orientation of the group:

1. Observe the weather conditions of the day.
2. Winter is one of the best seasons for an observation hike because we can see much more without the trees to hide things. Also, if there is snow on the ground, many animal tracks may be found.
3. The quieter we walk, the better our chances of seeing different animals. Wild animals usually have keener senses than ours, so they are likely to hear us long before we see or hear them.
4. We will not pick or collect anything on this hike as we want to leave the things observed in place for all the other groups to see.

B. General nature hike to and around the back acreage of the property:

1. This is not to be a tour with any regular stops, stations, or planned activities, but rather a general hike during which the students are to observe, compare, and discuss the various and different natural things that they may find. This is strictly an outside activity and will not move inside during foul weather, unless conditions are extremely severe.

2. Each numbered group is to have their own assigned bird feeder some place on the grounds that they will be responsible for filling during the course of their hike.
3. We may discuss the fact that all five of our senses (sight, hearing, touch, smell, and even taste), can be used to observe the world around us.
4. The instructors will encourage questions. We are not experts and do not know everything, but we like people who ask questions.
5. During the winter if Spring Creek is frozen hard enough we sometimes walk on top of the Creek itself to get to the back parts of the property. This gives the students a different prespective of the land around them.

C. Things that may be observed and discussed:

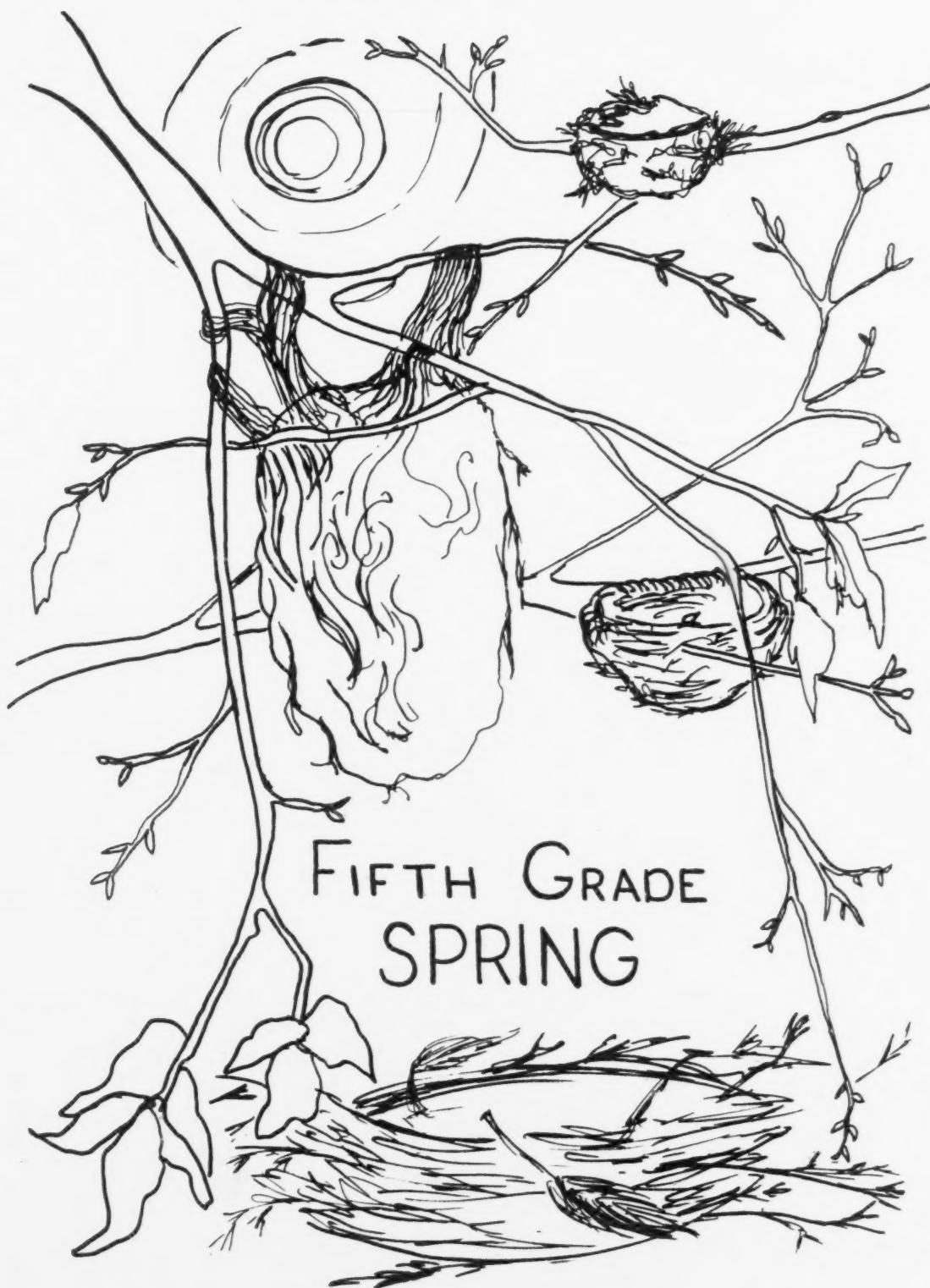
1. Mammals, such as squirrels, rabbits, and skunks.
2. Birds, such as blue jays, juncos, chickadees, woodpeckers, gold finches (with their olive drab winter plumage), and others.
3. Animal tracks will be especially apparent when there is snow on the ground, but we may be able to find some in mud on warm days also.
4. Bird nests.
5. Mammal homes, such as squirrel nests and ground hog holes.
6. Insects nests and eggs.
 - a. Cocoons under bark, in curled dead leaves, and in other protected places.
 - b. Mantus egg masses cemented to small twigs in shrubs.
 - c. Small dark eggs glued around the twigs of some trees, from which the very destructive tent caterpillars will hatch in the spring.
 - d. A butterfly chrysalis may be more difficult to find than the others, as they are often mistaken for a dead leaf.
 - e. Galls on some plants with the insect larva inside.
7. Carp in the creek.
8. Examples of soil erosion.
9. Valley formation due to the erosive action of streams.
10. Buds, fruit and seeds on various plants.
11. Fungi of various kinds and the decay they are helpful to cause.
12. The instructors may point out the large oak tree beyond the Lenker Manor pool which is of significance because of its diameter.

13. The instructor can point out that the Hemlocks along Spring Creek are better examples of our state tree than the ones near Boyd Building.
14. The group can check the success of the previous years reforestation projects now that the grass cover is not so thick.

Classroom Follow-up

1. Have students start a bulletin board and/or display table of pictures and items of "Things we observed at the Outdoor and Environmental Education Center."
2. List the various things they observed on their hike, perhaps dividing them into categories, such as, "Plant, Animal, Natural Non-Living, and Man-made Non-Living." (Don't forget the weather conditions of that day with such items as Fog, Dew, Rain, Clouds, Winds, and Snow).
3. Perhaps the students could write a short story like "If I could Hike at the Outdoor and Environmental Education Center Alone." How much more might they observe and why?
4. Make a list of new things observed and decide, if they are peculiar to the winter season, or not.

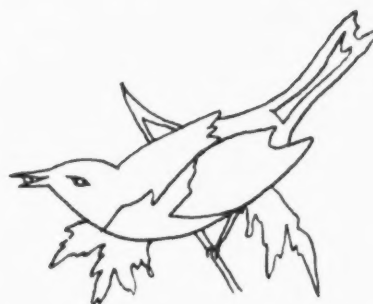




FIFTH GRADE
SPRING



BIRDS



Classroom Introduction

1. Obtain a parakeet or a canary for your classroom.
2. Start a list of "Birds We Have Seen."
3. Listen to records of bird calls.
4. Start a bulletin board of bird pictures.
5. Subscribe to "Audubon" the magazine of The National Audubon Society for your classroom. Their address is 1130 Fifth Avenue, New York, N. Y. 10028.
6. The Pennsylvania Game Commission prints colorful charts of many different birds. The address is: P. O. Box 1567, Harrisburg, 17120.
7. The pamphlet "25 Well Known Pennsylvania Birds," published by the Pennsylvania Game Commission not only contains pictures and descriptions of 25 species of resident avians, but has plans for bird houses, a list of 25 things you can do for game and songbirds, and a how to article on feeding wild birds. Send for enough copies for all your students. They're free.

O.E.E.C. Activity

- I. Characteristics
 - A. Vertebrates (have a backbone)
 - B. Warm-blooded (like mammals)
 - C. Feathers
 - D. Toothless beaks
 - E. Non grasping front limbs, called wings, usually capable of flight
 - F. Eggs have hard shell unlike leathery eggs or slimy egg masses of reptiles and amphibians

- II. Avian ancestry
 - A. Evolved from a small reptile group closely related to the dinosaurs
 - B. Some reptile characteristics remain
 - 1. scaly legs
 - 2. use of gravel or gizzard stones for digestion
- III. Numbers
 - A. 20,000 species in the world today
 - B. 1,500 in North America
- IV. Flight
 - A. Advantages over other classes of animals
 - 1. streamlined body shape
 - 2. specialized flight feathers
 - 3. hollow bones
 - 4. air sacs
 - 5. fast metabolism for continued activity
 - B. Feathers
 - 1. types
 - a. quill feathers (for flight)
 - b. contour feathers (cover the body)
 - c. down feathers (keep babies warm and undercoat adults)
 - 2. feathers are molted (like shedding fur)
 - 3. waterfowl feathers are kept warm, dry and buoyant by use of oil from a gland at the base of the tail
 - C. Not all birds fly
 - 1. ostrich and penguin
 - a. wings are useless for flight
 - b. depend on legs for locomotion
 - 2. roadrunner can fly to a limited extent but seldom does
- V. Eggs
 - A. Incubated by adults
 - B. Tremendous variety aids in identification
 - C. Size ranges from tiny hummingbird egg to great ostrich egg used as canteens in Africa
- VI. Nests
 - A. Constructed for the duration of the mating season
 - B. Each bird has recognizable design of its own
 - C. Building materials may include sticks, mud, string, feathers and all sorts of things
- VII. Eating habits
 - A. Controlled by the types of bill, legs and the birds position in nature
 - B. Birds of prey (eagles, hawks and owls) eat smaller birds, fish, amphibians, reptiles and mammals
 - C. Songbirds usually eat insects, worms, berries or seeds
 - D. Waterfowl are either bottom feeders or fish hunters

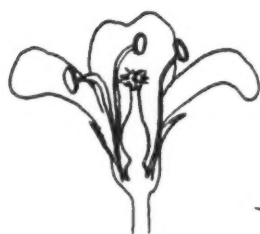
- VIII. Bird sounds
- A. Mating calls
 - B. Calls of warning or territory
 - C. The "cheeps" of chicks demanding food
 - D. Imitation of the human voice by parrots, crows and mynah birds
- IX. Migration
- A. Instinctive movements with seasonal change
 - B. Follow ancient flyways
 - 1. this area is within the Atlantic flyway
 - 2. some birds fly south to winter here:
 - a. great snowy owl
 - b. evening grosbeaks
 - 3. some birds fly north to summer here:
 - a. robins
 - b. orioles
 - c. red-winged blackbirds
 - C. Not all birds migrate
 - 1. some O.E.E.C. permanent residents are:
 - a. goldfinches
 - b. sparrows
 - c. crows
 - d. cardinals
 - e. blue jays
- X. Value to man
- A. Eat weed seeds, insects, rodents and other pests
 - B. Supply us with eggs and poultry products
 - C. Serve as game for carefully controlled hunting
 - D. Give us down feathers for warm clothing, quilts, pillows and sleeping bags
 - E. Make interesting pets
 - F. Are beautiful subjects for hobbies like photography and painting
 - G. Are aesthetically pleasing on the wing, and to listen to
- XI. Conservation
- A. Waterfowl, which nest in marsh lands, are decreasing in population as wet lands are drained for housing developments, factories, highways and other construction.
 - B. Much avian life has been eliminated by poisons and sprays meant for insects and other pests.
 - 1. the eagles, ospreys and other fish eaters are in danger of extinction due to DDT buildup resulting in thin egg shells
 - 2. many birds die from eating seeds sprayed with pesticides
 - C. Sea birds are killed in vast numbers when oil slicks cover the ocean trapping birds while they feed.
 - D. Farmers kill predatory birds like eagles, hawks, and owls because they believe they attack their stock.

- E. Over hunting threatens some species.
- F. Vain humans kill some birds like peacocks, humming-birds and ostriches for their plumage.

Classroom Follow-up

1. List and picture the endangered species of birds, those that are near extinction throughout the world. Discuss the dodo bird and the passenger pigeon.
2. Build some attractive bird shelters, watering devices, and feeders for outside your classroom.
3. Make a bird mobile for an art project.
4. Try to build birds nests of sticks, straw and mud. See if your students can equal the skills of a bird in nest building.
5. Bibliography. Four books we recommend.
 1. "Birds, A Guide to the Most Familiar American Birds," a Golden Nature Guide, by Herbert S. Zim, Ph.D., and Ira N. Gabrielson, LL.D., D. Sc., illustrated by James Gordon Irving, Golden Press, New York.
 2. "The How And Why Wonder Book of Birds," by Robert Mathewson, illustrated by Walter Ferguson and Ned Smith, Wonder Books, New York.
 3. "Field Guide to the Birds," Roger Tory Peterson, Houghton Mifflin Co., Boston.
 4. "Birds of North America, A Guide to Field Identification," by Chandler S. Robbins, Bertel Bruun, and Herbert S. Zim, illustrated by Arthur Singer, Golden Press, New York.
6. Films on birds in the Harrisburg School District film library are:
 - "Birds- How They Live Where They Live," #1017
 - "Birds Of The Countryside (3rd Ed)," #1165
 - "Birds Of The Woodlands," #1166
 - "Birds And Their Characteristics," #1169
7. Vocabulary:

Endangered	Feather	Extinction
Talon	Migration	Insecticide
Flock	Down feather	Predator



FLOWERS



Classroom Introduction

1. Ask your class where they see the most flowers growing in the city.
2. Discuss why people like and grow flowers. Of what use are they to people? Have the class imagine or draw two parks, one with flowers, one without them.
3. Plant some flower seeds in your classroom. Marigolds give good results.
4. See if you can get permission for a window box, or a plot to grow flowers on the school grounds.
5. Discuss the following questions. What use are flowers to plants? Do all plants have flowers? Can a picked flower perform its function?

O.E.E.C. Activity

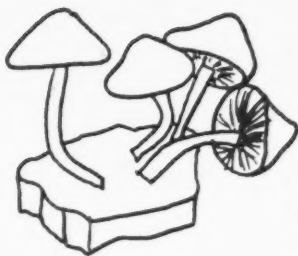
- I. The students will have fresh flowers to dissect and examine with the aid of a dissecting microscope and hand lenses.
 - A. They will look for and discuss the function of the following parts of the flower:
 1. Pistil (female part) composed of ovary, ovules, style and stigma
 2. Stamens (male part) composed of anther and filament
 3. Petals
 4. Sepals
- II. The students will examine some of the pollen from the flowers under a microscope and observe the different shapes and markings of pollen from different types of flowers.

- III. The process of fertilization will be discussed.
 - A. Students will put pollen on the stigma of a flower and note the adaptations of the stigma for retaining the pollen.
 - B. Then the processes will be discussed with the use of charts.
 1. Pollen sends a tube down the stigma into the ovule.
 2. Sperms are discharged which fuse with nucleii of the ovule. This fusion process is called fertilization.
 3. After this, the ovules develop into seeds and the ovary develops into the fruit.
 - C. An apple will be observed with the dried sepals still attached opposite the stem end.
- IV. The agents of pollination will be discussed.
 - A. Examples of wind pollinated and insect pollinated flowers will be available for comparison.
 - B. Students will discuss what makes these flowers look different and what makes them alike.
 - C. The class will discuss self and cross-pollination.

Classroom Follow-up

1. Discuss conservation of wildflowers with your class.
2. Develop some language arts concepts in connection with flowers. The use of comparisons of people to flowers, and so forth.
3. Vocabulary:

flower	stamen	ovule	petals
pollen	pistil	ovary	sepals
pollination	anther	style	florist
fertilization	filament	stigma	
4. Reference books
 1. "Flowers, A Guide to Familiar American Wildflowers." by Herbert S. Zim and Alexander C. Martin, A Golden Guide, Golden Press, New York.
 2. "The How And Why Wonder Book of Wild Flowers," by Grace Ferguson, Grosset and Dunlap, New York.
5. Films from the Harrisburg City Schools film library:
 - "How Does A Garden Grow," #1023
 - "What Do Flowers Do- A First Film," #1025
 - "Wildflowers Of The Field And Meadow," #1164



Simple Plants



Classroom Introduction

I. Understandings

1. None of the so-called simple plants ever get flowers or cones, or make seeds.
2. Most have no true roots, stems or leaves.
3. Most reproduce by small spores, instead of seeds.
4. Those which have no chlorophyll (the fungi) cannot make their own food.
5. The simple plants are divided into five main groups: algae; fungi; lichens; mosses; and ferns, all of which can be easily found locally.
6. These plants are important to us in many ways, in spite of the fact that they are often overlooked.

II. Activities

- A. Have the students name several plants. Most will probably be complex plants, which have roots, stems, leaves, chlorophyll and seeds for reproduction. Discuss the fact that there are other plants which have none of these things (the simple plants) but are nonetheless an important part of the living world.
- B. Bring in, or have the students bring in, a sample of each of the five types of simple plants for display.
- C. Develop a discussion incorporating the points in the "important facts" below.

III. Important facts about the five main groups of simple plants.

A. Algae

1. Mostly aquatic, although there are some land forms found in moist places. Many are microscopic in size.
2. Contain chlorophyll or other photosynthetic pigments.
3. Are important to us in many ways.
 - a. source of food either directly or indirectly for all aquatic animals.
 - b. source of a large percentage of the world's oxygen.
 - c. used by man for food, as an ingredient in ice cream and other varied uses.

- d. some contaminate water supplies and swimming pools.

B. Fungi

- 1. Lack chlorophyll and thus must live off of other plants or animals.
- 2. Reproduce by spores.
- 3. Are economically important.
 - a. cause many plant and animal diseases.
 - b. cause food spoilage.
 - c. cause mildew.
 - d. some are poisonous to man.
 - e. some can be eaten.
 - f. help maintain the balance of nature by helping materials to decay.
 - g. source of medicines such as antibiotics.

C. Lichens

- 1. Are certain types of algae and fungi living in a symbiotic relationship.
- 2. Importance:
 - a. are "pioneer" plants. They are often the first plants to appear in barren places.
 - b. provide food for animals.
 - c. used in making antibiotics.
 - d. used for making dyes.

D. Mosses

- 1. Lack true roots and stems, and the leaves are un-veined.
- 2. Reproduce by spores.
- 3. Are another "pioneer" plant.
 - a. often provide a seed bed for other plants.
 - b. help to prevent erosion.
- 4. Decayed moss forms peat, which is a source of fuel in some areas.

E. Ferns

- 1. "Half-way markers" between simple and complex plants.
 - a. they have true roots, stems and leaves, but
 - b. reproduce by spores.
- 2. Importance:
 - a. provide a ground cover.
 - b. help to prevent erosion.
 - c. some are used by florists.
 - d. the "fiddle-heads" or young growth are eaten by some people.

Vocabulary:

spores
true roots
antibiotics

symbiotic
photosynthetic pigments

O.E.E.C. Activity

This will be a tour of the O.E.E.C. grounds to observe simple plants in their natural habitat. Recognition, type of habitat, and ecological niche will be particularly stressed. Hand lenses will be available to the students for study of structural details.

I. Algae:

A. Habitat

1. mostly aquatic
2. moist places; tree bark on the side that gets the most moisture
3. a walk along the creek is likely to show some algae on rocks or on planks of bridges

B. Things to notice

1. look carefully at the algae with a magnifying glass. What color are they? The different colors are caused by various pigments

C. Points to ponder

1. when these plants are growing in rapidly moving water, why do they usually attach to rocks rather than just the soil?
2. can they make their own food? How can you tell?

II. Fungi:

A. Habitat

1. tree stumps
2. tree limbs
3. ground growth from the organic materials in the soil
4. usually dark and damp areas.

B. Things to notice

1. with a magnifying glass, look for thin root-like structures called mycelium
2. look for spores
3. various colors

C. Points to ponder

1. since they cannot make their own food, how can they live?
2. how can they grow without sunlight?
3. where are the spores found on different types of fungi?

D. Types likely to be found

- | | |
|-----------------|----------------|
| 1. mushrooms | 5. cup fungus |
| 2. shelf fungus | 6. puff balls |
| 3. slime molds | 7. stink horns |
| 4. mildew | |

III. Lichens:

A. Habitat

1. usually on rocks and trees

B. Things to notice

1. two different colors and plants (an algae and a fungus) the fungus is the most conspicuous part.
Try to find the two plants with a magnifying glass.
2. notice different forms which may be shrubby, leaf-like, or crusty

C. Points to ponder

1. how do the two plants help each other?

IV. Mosses:

A. Habitat

1. rocks
2. trees
3. ground cover
4. occasionally in streams and ponds, but more often on the banks and on rocks sticking up out of the water

B. Things to notice

1. spores are produced in capsules. With a magnifying glass look at various capsules carefully.
They are not all the same
2. look at the leaves of various types of mosses.
Are they the same?

C. Points to ponder

1. how do you think the spores get out of the capsules?
2. are these plants as "simple" as the algae?

V. Ferns:

A. Habitat

1. most often in shady locations
2. ground cover

B. Things to notice

1. with a magnifying glass, look at the leaves
2. look for rolled up leaves called - fiddleheads
3. try to find the spores.

C. Points to ponder

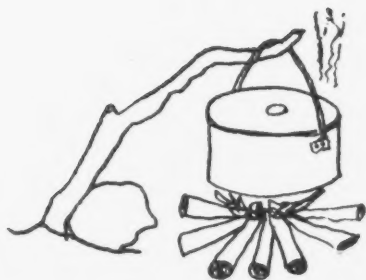
1. ferns are called "half-way plants," between simple and complex plants. Why?
2. how are these plants better developed than the other kinds we've seen?

Foul Weather Alternative

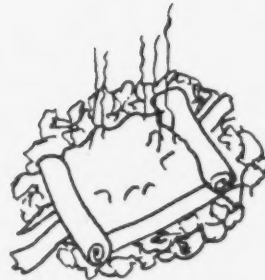
1. Observing an aquarium with aquatic algae.
2. Using a microscope to view the cellular structure of algae.
3. Viewing various spores under the microscope.
4. Handling and discussing a display of different types of simple plants.
5. Viewing the structure of fungi, mosses, lichens and fern sporangia under hand lenses.

Classroom Follow-up

1. Make a terrarium using simple plants. You may include one or two small reptiles or amphibians.
2. Make a mushroom "spore-print."
 - a. obtain a large mushroom (gilled mushrooms are the most effective).
 - b. place the mushroom on a piece of dark paper, if spores are light, light paper, if spores are dark. Try both with one kind of mushroom, if spore color is unknown.
 - c. place a jar over the mushroom, and allow it to dry for several days, or until the mushroom is completely dried out.
 - d. remove the jar and mushroom.
 - e. a "print" made of spores from the mushroom should be on the paper. This "spore-print" will display the way the spores were inside the gills of the mushroom.
 - f. to preserve the print, carefully spray it with lacquer or hair spray.
3. Research and discuss the fungus diseases which afflict man. Examples: ringworm, athlete's foot.
4. Find out how penicillin is made.
5. Films from the Harrisburg City Schools film library about simple plants are:
"Plants That Have No Flowers Or Seeds," #1161
"Plants That Live In Water," #1162
"The Terrarium- Classroom Science," #282
6. References that may be helpful:
 - a. "Non-flowering Plants," A Golden Nature Guide, by Floyd S. Shuttlesworth and Herbert S. Zim, Golden Press, New York.
 - b. "The How And Why Wonder Book of Mushrooms, Ferns and Mosses," by Amy Elizabeth Jense, Wonder Books, New York.



OUTDOOR COOKING



Classroom Introduction

1. Study nutrition and digestion.
2. Discuss the history of cooking, including different types of fires, the development of utensils, packaging and preserving of foods.
3. Discuss the eating habits of different countries and cultures.
4. Plan several outdoor menus, making sure that they are balanced nutritionally and are feasible for carrying on a camping trip.

O.E.E.C. Activity

OBJECTIVE

To show the students how to prepare a meal which can be made at home and carried to a camp site to be cooked or which can be made at the outdoor cooking area itself.

This activity correlates with several other classes at the O.E.E.C. in which we teach camping skills. The wood which is burnt will be that which the students themselves cut and stacked during a winter wood cutting class.

MENU:

Stew- known as hobo, hunters or campers stew.

INGREDIANTS:

Frozen hamburg patties
Whole canned potatoes
Carrots
Celery

Onions
Catsup
Salt and pepper

ADDITIONAL SUPPLIES:

Beverage- usually Kool-aid, cups and pitchers	Napkins- large
Thongs and gloves	Small kitchen knives
Aluminum foil- 24" institutional type	Paring knives
Pitchfork- short handled	#10 tin cans
Sporks- spoon-fork combination	Serving trays
Cutting boards	

PREPARATION:

The hamburg patties are broken into small pieces and mixed with the potatoes, carrots and celery which should be cut to bite size. Then the onions are diced and added to the mix.

An 18" to 24" sheet of aluminum foil is folded in half with the shiney side in. It is made into a bag, by folding the sides twice. These inch-wide, side folds are pressed tightly so they will be watertight.

The raw food is put into the bag, and seasoning (salt, pepper and catsup) added to taste. A spoonful of water from the canned potatoes is then poured in. Next, the top of the bag is sealed with two folds. This folding must be done carefully too, for when the package is completed it should be airtight.

INSTRUCTION:

The instructor will make a demonstration package explaining each step in the procedure. Next he will pass out the cutting boards, knives, and the ingrediants of the stew. He will walk around the tables giving each student aid as they need it.

As the students finish their "mix" he will collect their knives and cutting boards and give them a sheet of aluminum foil. When everyone has completed their package, the waste will be put in #10 cans, and the tables cleaned.

COOKING:

The fire will be built in a long, cinder-block-sided, fire place. The instructor will knock the hot coals off the burning logs with the pitchfork and roll the logs to the other end of the fireplace.

He will spread the coals out flat making sure that there are no flaming embers to burn the aluminum foil.

The food package will be laid on the bed of coals to cook. If they have been sealed correctly they should puff up as the natural juices and water turn to steam.

The packets should be turned once during cooking, the time period for each side depending on the heat of the coals.

When the instructor has decided that the food is ready, he will use the thongs to remove his from the heat. He should open his carefully so that if it is not done he can refold it and place it back on the fire.

When the food is cooked thoroughly, all the packets will be removed and put on the cinder blocks to cool. The foil cools quickly.

Each student will then take his foil bag, open the top, and fold down the sides to improvise a bowl. This way the stew can be eaten directly out of the bag in which it was cooked.

After the food is eaten the picnic table will be washed, the foil and napkins thrown in the proper receptacles, and the fire put out.

Classroom Follow-up

1. Discuss with your students the practicality of an outdoor meal like the one cooked at the O.E.E.C. Decide if it was balanced nutritionally. Review why the aluminum foil package had to be sealed tightly.
2. Suggest that the students cook a similar meal at home for their parents.
3. Hold a picnic for your homeroom and their parents and have the students prepare what they learned to cook at the O.E.E.C.
4. Vocabulary
 - Utensil
 - Menu
 - Air-tight
 - Water-tight
 - Nutrition
 - Digestion



REFORESTATION



Classroom Introduction

1. Study the importance of trees to mankind.
2. Contribute to a "Ways We Use Trees" bulletin board. Include in it pictures of the early virgin forests, lumbering operations, sawmills, reforesting sites and paper mills.
3. Obtain a tree seedling for your classroom. Have the students care for it.

O.E.E.C. Activity

Several hundred years ago, the Eastern United States was covered by great, seemingly endless, virgin forest. Giant groves of trees, hundreds of years old, awed the first pioneers. This early America was truly a natural paradise of animal life, wild, swift waters, and "purple mountain majesty."

As the population grew, the giant forests were cut down, to build houses, clear land for farming, and provide firewood. By the beginning of the 20th century, great lumber factories were fed by thousands of small railroads which penetrated the hills and forests. Clear-cutting produced erosion and washed away much soil. One by one the great virgin trees fell to the sounds of the saw and the axe.

Today, we still have a few thousand acres of these great trees in small lots dotted throughout the Eastern mountains. They are only a shadow, a mere remnant, of what once was. It is a constant fight for conservationists to save even these remnants. Now, the forests are second, third, and even fourth growth stands, where the giant trees once stood. The trees are small, close together, and crowded by undergrowth.

With proper care, the National Forest Service has restored these woods as well as can be done. They will never again be as they were, because the conditions needed for the forests to mature to that point are gone forever.

At the Outdoor and Environmental Education Center, our woods are composed of small scrub brush and second growth trees. A few large ornamental trees can be seen near the buildings. One ancient oak tree, 17 feet in circumference, is all that remains to remind us of the great forests. Most of the children have been shown our "Indian Tree."

We are trying, in a long term project, to replant our eroding slopes, so that some day a decent woods will cover our bare hills. The spring project will involve the children's planting of thousands of young seedlings of both deciduous and evergreen varieties.

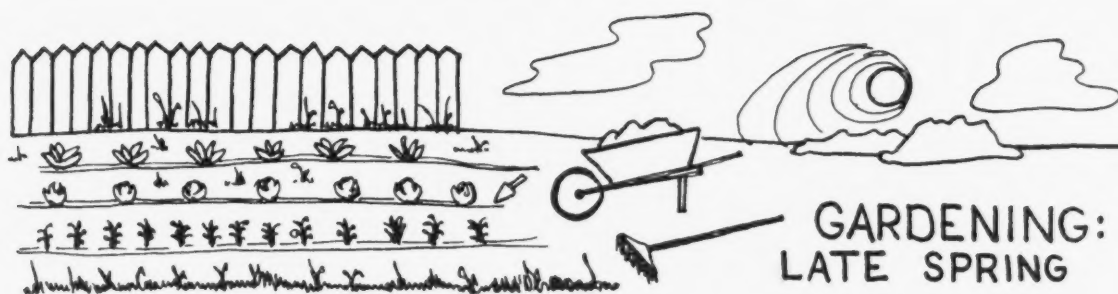
The trees will be found "heeled-in," that is temporarily placed in moist storage trenches, until ready for final planting. Clumps of seedlings will be removed and carried in a moist bucket to the planting site, preferably on shaly banks and hillsides. They will serve to rejuvenate the forest cycle in their area.

Small shovels and mattocks will be used to dig holes approximately 6 inches deep and across. A handful of fertilizer, some water, and a seedling are placed in the hole and the earth carefully returned. It is then packed in and more water is poured on the site. Good spacing of plants is necessary and will be directed by the instructor.

Classroom Follow-up

1. Where possible initiate a landscape project around your school.
2. Discuss why tree planting is needed at the OEEC.
3. On a nature walk in your community study landscaping, identify trees, illustrate proper use of trees for shade, point out how trees damage sidewalks, discuss why trees need to be trimmed in the city and transplant some seedlings that you see couldn't possibly grow into adult trees in the spot where they have germinated.
4. Vocabulary:

Reforestation	Sapling	Tree Nursery
Landscape	Seedling	Arbor Day
	Transplant	



Classroom Introduction

1. Collect pictures of food and flowers commonly grown in Pennsylvania gardens for a scrapbook.
2. Make a survey of the type of gardens your students may be familiar with. Flower gardens (parks, yards, window boxes, potted, flowering and green plants). Vegetable gardens (for home grown food). Truck farms (commercial vegetables). Crop farms (growing wheat, corn and others).
3. Secure seed catalogues and have your students give short reports on a vegetable or flower grown in this area. Illustrate the varieties of the particular plant that are available; planting instructions; harvesting time and procedure; preservation for home or sales; and uses.

O.E.E.C. Activity

The groups that visit in late spring will complete the gardening preparation. They will clear the ground of weeds and stones, stake out the garden perimeter spade, rake, and add mulch and fertilizer to the soil.

When the above is done, they will plant vegetables, flowering plants and other seeds as the planting season progresses. These activities will include making rows from garden plans, weeding, watering, and controlling pests.

They will tend the beds of tulips and crocuses which were planted in the fall. Rose bushes, irises and other perennials will also be cared for.

Safe use of garden tools will be stressed.

Care will be taken to show all the students that by following directions, taking their time, and using care, plants can be grown which can supplement a food budget and beautify many small plots of ground.

All plants need certain conditions to grow well. The students will be advised of the following:

1. Loose, moist soil.
2. Sufficient space to allow growth.
3. Sunshine and warm temperatures.
4. Proper soil nutrients.
5. Water.

Indoor Alternative

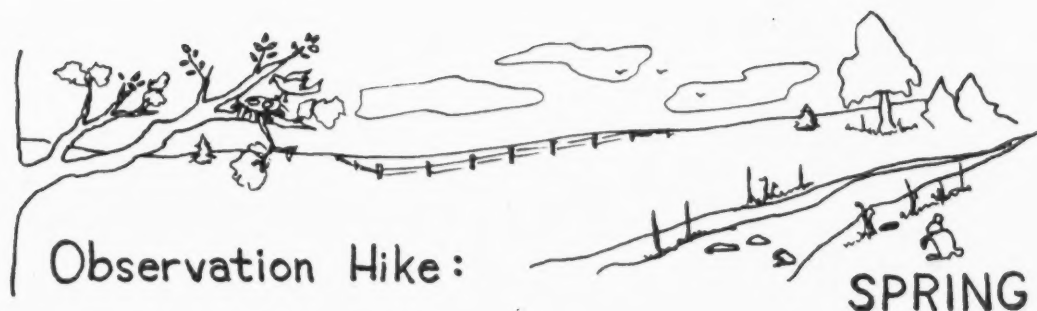
1. The care of plants being raised for later planting.
2. Maintenance of garden tools.
3. Discussion of plants and their needs.
4. Garden design and planning.

Classroom Follow-up

1. Start plants in the classroom that may be transplanted outside at the beginning of our growing season in mid-May. Vegetables like tomatoes, peppers, and cabbage, and flowers like petunias and pansies are usually successful.
2. Have a vegetable and/or flower drawing "bee" to see if the students can draw from memory the vegetables and seeds you have discussed. Show them pictures of the ones you mentioned when the "bee" is completed.
3. Vocabulary:

Catalogue	Vegetable	Harvest
Fertilizer	Flat	Budget
4. Films:
"Food For The City- Wheat And Flour," #1057.
"Cotton Picking And Ginning (2nd Ed)," #1060.





Classroom Introduction

1. Discuss the winter observation hike at the OEEC with your students. Then talk about what they might see on the Spring hike.
2. Remind your students that they should dress to hike through fairly dense undergrowth in the woods (long pants, shoes that cover the feet, raincoats when necessary, and boots). Remember that Spring is usually wet. The woods can still be muddy even on a sunny day.
3. Hiking groups are reminded to follow a few simple rules while they are at the O.E.E.C. Please discuss these with your students.
 - A. Stay together as a group.
 - B. Please do not kill any plants or animals.
 - C. Please do not pick or collect any souvenirs. We want to leave things in the forest for other groups to see.
 - D. Help us to keep the forest clean and healthy by carrying litter out with you and throwing it away when you get back.
4. Find out which birds will return to our area in the Spring.
5. Discuss why plants begin to grow again in the Spring.

O.E.E.C. Activity

This hike is designed to be a general tour without any regular stops or planned activities. Students will have an opportunity to see, smell, hear, touch, and in some cases taste and then discuss the natural things which they may find.

In the spring, some interesting things can be seen on the hike. Here are some to look for:

1. Fungus - plants that are not green and cannot make their own food. By feeding on dead trees, stumps, logs, and just about everything else fungi help nature to make room for new plants. They are very abundant here at the OEEC.
2. Aside from fungus, the students will be able to observe the four other simple plants that they are studying in their simple plants activity here this spring. Moss and lichen are easy to find, algae can be seen in the creek, and in the back acres of our property there are a few ferns.

3. Birds tending their newly built nests.
4. Mammal nests- squirrel, rabbit, and others.
5. Small animal holes in the ground that might belong to groundhogs, muskrats, or chipmunks.
6. Animal tracks in soft earth especially along the creek and in the marshy areas.
7. Fish, tadpoles, frogs, turtles and salamanders in or near Spring Creek.
8. Wild flowers and other new plants beginning to grow.
9. Insects and their nests and eggs.
 - a. Tent caterpillars which are destructive to mulberry and wild cherry trees.
 - b. Praying Mantis egg masses and nymphs.
 - c. Wasp galls on certain plants.
10. Soil erosion.
11. Different vegetation in the forest, fields and swamps.
12. Buds, flowers, and young leaves of assorted trees.
13. Poison ivy and other vines.

Classroom Follow-up

1. Compare the two seasonal hikes that were taken by the students. Good essay titles could be, "How things change with the seasons," or "What happens to the woods when the seasons change."
2. Discuss what the woods might look like in the summer time.
3. Discuss what clothes should be worn on a hike during the four different seasons.